

**WHAT IS CLAIMED IS:**

1           1. A process for fabricating an integrated electronic  
2 circuit whereby at least one air gap is formed above only a  
3 defined portion of a surface of a substrate, said defined  
4 portion being smaller than the surface of the substrate,  
5 within an interconnect layer comprising a part of a  
6 sacrificial material and extending beneath an intermediate  
7 layer of permeable material, interconnect elements being  
8 formed within a subpart of said part of sacrificial material  
9 of the interconnect layer, and whereby the air gap is formed  
10 by removal, through the intermediate layer, of at least said  
11 subpart of sacrificial material of the interconnect layer by  
12 bringing the permeable material into contact with an agent for  
13 removing the sacrificial material, to which agent the  
14 permeable material is resistant, said intermediate layer  
15 remaining rigidly linked to the substrate outside said defined  
16 portion.

1           2. The process according to Claim 1, comprising the  
2 following steps:

3           a) a first part of the interconnect layer is formed with  
4 a permanent material outside said portion of the surface of  
5 the substrate;

6           b) a second part of the interconnect layer is formed with  
7 the sacrificial material inside said portion of the surface of  
8 the substrate;

9           c) the interconnect elements are formed within the second  
10 part of the interconnect layer;

11          d) the intermediate layer of permeable material is  
12 deposited on the interconnect layer at least above said  
13 portion (P) of the surface of the substrate; and

14          e) all of the sacrificial material of the interconnect  
15 layer is removed through the intermediate layer.

1           3. The process according to Claim 2, whereby the  
2 permanent material (10) is identical to the permeable  
3 material.

1           4. The process according to Claim 2, whereby step b) of  
2 forming the second part of the interconnect layer is carried  
3 out before step a) of forming the first part of the  
4 interconnect layer.

1           5. The process according to Claim 4, whereby the  
2 permanent material (10) is identical to the permeable  
3 material.

1           6. The process according to Claim 2, whereby step a) of  
2 forming the first part of the interconnect layer, step b) of  
3 forming the second part of the interconnect layer, step c) of  
4 forming the interconnect elements and step d) of depositing  
5 the intermediate layer are repeated several times before step  
6 e) of removing the sacrificial material, so as to form, above  
7 the surface of the substrate, a stack comprising several  
8 interconnect layers separated by intermediate layers of  
9 permeable material and comprising respective layers of  
10 sacrificial material above respective portions of the surface  
11 of the substrate and whereby, during step e) of removing the  
12 sacrificial material, the sacrificial material of the  
13 interconnect layers is removed by bringing the permeable  
14 material of the intermediate layers into contact with the  
15 agent for removing the sacrificial material so as to form  
16 respective air gaps in each of the interconnect layers.

1           7. The process according to Claim 1, comprising the  
2 following steps:

3           a) the interconnect layer is formed with the sacrificial  
4 material on the surface of the substrate inside said portion;

5           b) the interconnect elements are formed within the  
6 interconnect layer;

7           c) the intermediate layer of permeable material is  
8 deposited on the interconnect layer in said portion of the  
9 surface of the substrate and on the surface of the substrate  
10 around the interconnect layer, outside said portion of the  
11 surface of the substrate; and

12           d) all of the sacrificial material of the interconnect  
13 layer is removed through the intermediate layer.

1           8. The process according to Claim 7, whereby step a) of  
2 forming the interconnect layer, step b) of forming the  
3 interconnect elements and step c) of depositing the  
4 intermediate layer are repeated several times before step d)  
5 of removing the sacrificial material, so as to form, above the  
6 surface of the substrate, a stack comprising several  
7 interconnect layers that are separated by intermediate layers  
8 of permeable material and are surrounded, parallel to the  
9 surface of the substrate, by permeable material outside  
10 respective portions of the surface of the substrate and  
11 whereby, during step d) of removing the sacrificial material,  
12 the sacrificial material of the interconnect layers is removed  
13 by bringing the permeable material of the intermediate layers  
14 into contact with the agent for removing the sacrificial  
15 material so as to form respective air gaps in each of the  
16 interconnect layers.

1        9. The process according to Claim 1, comprising the  
2 following steps:

3        a) the interconnect layer is formed with the sacrificial  
4 material on the surface of the substrate inside and outside  
5 said portion;

6        b) the interconnect elements are formed within the  
7 interconnect layer above said portion of the surface of the  
8 substrate;

9        c) an intermediate layer of permeable material is  
10 deposited on the interconnect layer inside and outside said  
11 portion of the surface of the substrate;

12       d) a mask impermeable to the agent for removing the  
13 sacrificial material is formed above the intermediate layer,  
14 the mask having an aperture corresponding to said portion of  
15 the surface of the substrate; and

16       e) part of the sacrificial material of the interconnect  
17 layer is selectively removed through the intermediate layer,  
18 the selectively removed part of the sacrificial material being  
19 bounded by the mask in a direction parallel to the surface of  
20 the substrate.

1       10. The process according to Claim 9, whereby the mask  
2 is formed on the intermediate layer of permeable material.

1       11. The process according to Claim 9, whereby step a) of  
2 forming the interconnect layer, step b) of forming the

3 interconnect elements and step c) of depositing the  
4 intermediate layer are repeated several times before step d)  
5 of forming the mask, so as to form, above the surface of the  
6 substrate, a stack comprising several interconnect layers that  
7 are separated by intermediate layers of permeable material and  
8 whereby, during step e) of removing the sacrificial material,  
9 part of the sacrificial material of the interconnect layers is  
10 selectively removed by bringing, via the aperture of the mask,  
11 the permeable material of the intermediate layers into contact  
12 with the agent for removing the sacrificial material so as to  
13 form respective air gaps in each of the interconnect layers.

1 12. The process according to Claim 1, whereby, during  
2 formation of the interconnect elements, a layer of a barrier  
3 material covering at least part of the faces of the  
4 interconnect elements is formed.

1        13. An integrated electronic circuit comprising:

2        a) an interconnect layer comprising part of a first  
3 material covering a surface of a substrate outside a defined  
4 portion of the surface of the substrate, interconnect elements  
5 located above said portion of the surface of the substrate  
6 within one air gap; and

7        b) an intermediate layer of a permeable material placed  
8 above the interconnect layer, said interconnect layer being  
9 rigidly linked to the substrate outside said defined portion,  
10 and the permeable material being different from said first  
11 material.

1        14. The circuit according to Claim 13, in which at least  
2 part of the faces of the interconnect elements is covered with  
3 a layer of a barrier material.

1        15. The circuit according to Claim 13, in which the  
2 interconnect elements are lines approximately parallel to the  
3 surface of the substrate.

1        16. The circuit according to Claim 13, which furthermore  
2 includes electrical contacts in a direction approximately  
3 perpendicular to the surface of the substrate and placed  
4 within the intermediate layer.



1        17. The circuit according to Claim 13, which comprises  
2        at least first and second interconnect layers separated by an  
3        intermediate layer of permeable material, the first  
4        interconnect layer comprising the part of the first material  
5        above the surface of the substrate outside said portion of the  
6        surface of the substrate, first interconnect elements located  
7        above said portion of the surface of the substrate, and the  
8        air gap located between said first interconnect elements in  
9        said portion of the surface of the substrate, the second  
10       interconnect layer comprising part of a second material placed  
11       above the intermediate layer outside another defined portion  
12       of the surface of the substrate, second interconnect elements  
13       located above said other portion of the surface of the  
14       substrate and at least one other air gap located between said  
15       second interconnect elements in said other portion of the  
16       surface of the substrate.